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Russell Consulting

COST OF SERVICE STUDY

FOR

PITTSFIELD AQUEDUCT COMPANY, INC.

ALLOCATION OF REVENUE REQUIREMENTS

Once the total revenues to be recovered from rates has been determined, the next step in developing new tariffs is a cost of service study. The purpose of such a study is to allocate all expense categories to various cost components. The cost components that are used should represent the types of service provided by the water utility. The Pittsfield Aqueduct Company (the "Company") provides three types of service:

o General Water Service - supplying water to residents and businesses in the service area, on demand, 24 hours per day. This service includes the provision of average or base use demands as well as peak demands.

o Fire Service - Providing adequate supply, distribution, and storage capacity to public fire hydrants and privately owned sprinkler connections so that water is available at all times, in sufficient quantities for extinguishing fires.

o Customer Service - providing meter reading, billing and customer accounting services, as well as water meters and services from the mains to the customer's property.

Allocation to General Water, Fire Protection and Customer Service

Operation and Maintenance

To determine the appropriate expenses associated with each type of service, the pro forma expenses are first allocated to these major cost components. Schedule 1 contains the allocation of pro forma expenses to each of these services. The pro forma expenses on this Schedule are the same as those resulting in the proposed rate increase.

While the value of the Company's property, plant and equipment is not an expense item for rate purposes, it is used in the allocation of costs. Schedule 2 contains the allocation of plant investment to general water service, fire protection service, and customer service The amounts shown on this schedule for each plant account corresponds to the level of plant included in the Company's proposed rate base.

Both the return on investment and taxes, with one small exception, are allocated to these categories of service using the percentages developed on Schedule 2.

Depreciation

Schedule 3 contains a listing by account of annual depreciation expenses, and presents the allocated amounts to general water service, fire protection service and customer service. Both the total depreciation expense and the allocated amounts are carried forward to the summary schedule described below.

SUMMARY

Schedule 4 provides a summary of all rate revenue requirements allocated to general water service, fire protection service and customer service. O & M costs and depreciation expense were allocated using the overall percentages for each of these costs developed above. Since the return on rate base is directly related to the level of capital investment in various rate base facilities, it was allocated based on the same overall percentages developed for utility plant in service. With one exception, taxes were allocated in the same manner due to their dependence on the level of return or assessed plant values. The one exception relates to the portion of taxes resulting from payroll taxes. These are allocated using the overall percentages derived from the allocation of all O & M expenses, which to a large degree reflects labor costs (see allocator T - bottom half of Schedule 4). Lastly, the cost of borrowed funds for the New Water Treatment Facility were allocated using allocator A, for the portion ($735,000) associated with the treatment plant, and allocator E for the portion ($245,000) associated with storage facilities (see allocator P - bottom half of Schedule 4).

As shown on this summary schedule the total allocated to the provision of general water service is $269,648 (69.6%), to fire protection service - $93,199 (24.0%) and to customer service - $24,662 (6.4%).

Basis for Allocations

Each expense item is allocated to one of three service components discussed above. basis of each allocation corresponds to an allocation symbol shown on Schedules 1 through 4 by account, and each is described below:

* Symbol A - Expense items corresponding to this symbol are associated with water supply, pumping and treatment. These expenses were allocated 98% to general service and 2% to fire protection service based on a nominal estimate of the amount of water used in fighting fires, testing of Fire Department equipment, training of Fire Department personnel, and related miscellaneous use.

  Symbol B - This symbol is associated with expense items that are designed or operated to meet maximum day plus fire demands They were allocated 50.0% to general water service and 50.0% to fire protection service based on the following system demands.

Maximum Day Demand	300,000 Gals.	50.0%
Fire Demand	300,000 Gals.	50.0%
Max. Day plus Fire Demand	600,000 Gals	100.00%

* Symbol C - These expenses are related 100% to the provision of customer services.

* Symbol D - This symbol is associated with general and administrative operating expenses which could not be directly allocated. Accordingly, these costs were allocated 74.8% to general water service, 18.1% to fire protection service, and 7.1% to customer service, based on all other operating expenses that could be directly allocated.

* Symbol E - This symbol is applicable to all storage facilities. These facilities were allocated 33% to general water service and 67% to fire protection service based on the need to provide for fire flow requirements. Since the proposed tank has a capacity of 450,000 gallons, the portion allocated to fire protection service is 67 % (300/450), and the remaining 33% (150/450) was allocated to general water service.

* Symbol F - This symbol correspond to fire hydrant costs which were allocated 98% to fire protection service and 2 % to general water service in recognition of the fact that a portion of fire hydrant costs can be attributed to general water service because hydrants are used for general water system purposes such as flow testing and cleaning of distribution piping through periodic flushing.

* Symbol G - This symbol is associated with utility plant costs that could not be directly allocated. Accordingly, these costs were allocated 60.9% to general water service, 31.5% to fire protection service, and 7.6% to customer service, based on all other plant items that could be directly allocated.

* Symbol H - This symbol is associated with depreciation expenses which could not be directly allocated. Accordingly, these costs were allocated 53.3% to general water service, 30.6% to fire protection service, and 16.1% to customer service, based on all other depreciation expenses that could be directly allocated.

Operation and Maintenance Expenses

			Alloc. Symbol	General Water %	General Water Amount	Fire Protection %	Fire Protection Amount	Customer Service %	Customer Service Amount
Pumping Expenses									
	Operations								
623	Fuel or Power Purchased for pumping	$275.00	A	98.00%	$269.50	2.00%	$5.50	0.00%	$0.00
	Maintenance								
631	Maintenance of Structures and Improvements	$0.00	A	98.00%	$0.00	2.00%	$0.00	0.00%	$0.00
Total Pumping Expenses		$275.00							
Water Treatment Expenses									
	Operations								
640	Operation Supervision and Engineering	$4,547.00	A	98.00%	$4,456.06	2.00%	$90.94	0.00%	$0.00
641	Chemicals	$4,016.00	A	98.00%	$3,935.68	2.00%	$80.32	0.00%	$0.00
642	Operation Labor and Expenses	$1,713.00	A	98.00%	$1,678.74	2.00%	$34.26	0.00%	$0.00
643	Miscellaneous Expenses	$1,686.00	A	98.00%	$1,652.28	2.00%	$33.72	0.00%	$0.00
	O&M Expense - New Treatment Plant	$38,010.00	A	98.00%	$37,249.80	2.00%	$760.20	0.00%	$0.00
	Total Water Treatment Expenses	$49,972.00							
Transmission and Distribution Expenses									
	Operations								
660	Operation Supervision and Engineering	$9,280.00	B	50.00%	$4,640.00	50.00%	$4,640.00	0.00%	$0.00
662	Transmission and Distribution Lines Expense	$1,342.00	B	50.00%	$671.00	50.00%	$671.00	0.00%	$0.00
663	Meter Expenses	$0.00	C	0.00%	$0.00	0.00%	$0.00	100.00%	$0.00
664	Customer Installations Expense	$30.00	C	0.00%	$0.00	0.00%	$0.00	100.00%	$30.00
665	Miscellaneous Expenses	$0.00		0.00%	$0.00	0.00%	$0.00	0.00%	$0.00
666	Rents	$0.00							
	Total Operations	$10,652.00							
	Maintenance								
671	Maintenance of Structures and Improvements	$111.00	B	50.00%	$55.50	50.00%	$55.50	0.00%	$0.00
	Maintenance of Storage Facilities	$4,390.00	E	33.33%	$1,463.19	66.67%	$2,926.81	0.00%	$0.00
673	Maintenance Transmission and Distribution Lines Exp.	$11,111.00	B	50.00%	$5,555.50	50.00%	$5,555.50	0.00%	$0.00
674	Maintenance of Fire Mains	$0.00	F	0.00%	$0.00	100.00%	$0.00	0.00%	$0.00
675	Maintenance of Services	$230.00	C	0.00%	$0.00	0.00%	$0.00	100.00%	$230.00
676	Maintenance of Meters	$1,302.00	C	0.00%	$0.00	0.00%	$0.00	100.00%	$1,302.00
677	Maintenance of Hydrants	$46.00	F	2.00%	$0.92	98.00%	$45.08	0.00%	$0.00
678	Maintenance of Miscellaneous Equipment	$0.00		0.00%	$0.00	0.00%	$0.00	0.00%	$0.00
	Total Maintenance	$17,190.00							
Total Transmission and Distribution Expenses		$27,842.00							

Customer Accounts Expense									
	Operation								
902	Meter Reading Expense	$1,240.00	C			0.00%		100.00%	$1,240.00
903	Customer Records and Collection Exps.	$2,727.00	C			0.00%		100.00%	$2,727.00
904	Uncollectable Accounts	$289.00	C			0.00%		100.00%	$289.00
Total Customer Accounts Expense		$4,256.00							
Administrative and General Expenses									
	Operation								
920	Administrative and General Salaries	$11,921.00	D	74.84%	$8,921.85	18.09%	$2,156.89	7.07%	$842.27
921	Office Supplies and Other Expenses	$3,711.00	D	74.84%	$2,777.37	18.09%	$671.44	7.07%	$262.20
923	Outside Services Employed	$6,880.00	D	74.84%	$5,149.09	18.09%	$1,244.81	7.07%	$486.10
	Property Insurance	$5,061.00	D	74.84%	$3,787.72	18.09%	$915.70	7.07%	$357.58
925	Injuries and Damages	$0.00	D	74.84%	$0.00	18.09%	$0.00	7.07%	$0.00
	Regulatory Commission Expenses	$732.00	D	74.84%	$547.84	18.09%	$132.44	7.07%	$51.72
930	Miscellaneous General Expenses	$1,087.00	D	74.84%	$813.53	18.09%	$196.67	7.07%	$76.80
931	General Rents	$1,800.00	D	74.84%	$1,347.15	18.09%	$325.68	7.07%	$127.18
Total Administrative and General Salaries		$31,192.00							
Total Operation and Maintenance Expenses		$113,537.00		74.84%	$84,972.70	18.09%	$20,542.46	7.07%	$8,021.84
									0.000
		$82,345.00	D	74.84%	$61,628.17	18.09%	$14,898.83	7.07%	$5,818.00

Utility Plant in Service (Dec. 31, 1995)

			Alloc. Symbol	General Water %	General Water Amount	Fire Protection %	Fire Protection Amount	Customer Service %	Customer Service Amount
Source of Supply and Pumping Plant									
303	Land and Land Rights	$28,816.00	A	98.00%	$28,239.68	2.00%	$576.32	0.00%	$0.00
304	Structures and Improvements	$13,162.00	A	98.00%	$12,898.76	2.00%	$263.24	0.00%	$0.00
Total Supply and Pumping Plant		$41;978.00							
Water treatment Plant									
304	Structures and Improvements	$6,550.00	A	98.00%	$6,419.00	2.00%	$131.00	0.00%	$0.00
320	Water Treatment Equipment	$10,875.00	A	98.00%	$10,657.50	2.00%	$217.50	0.00%	$0.00
	New Treatment Plant	$735,000.00	A	98.00%	$720,300.00	2.00%	$14,700.00	0.00%	$0.00
Total Water treatment Plant		$752,425.00							
Transmission and Distribution Plant									
331	Transmission and Distribution Mains	$927,039.00	B	50.00%	$463,519.50	50.00%	$463,519.50	0.00%	$0.00
	Storage Reservoir	$245,000.00	E	33.33%	$81,658.50	66.67%	$163,341.50	0.00%	$0.00
333	Services	$83,375.00	C	0.00%	$0.00	0.00%	$0.00	100.00%	$83,375.00
334	Meters and Meter Installations	$83,181.00	C	0.00%	$0.00	0.00%	$0.00	100.00%	$83,181.00
335	Hydrants	$43,848.00	F	2.00%	$876.96	98.00%	$42,971.04	0	$0.00
Total Transmission and Distribution		$1,382,443.00							
General Plant									
303	Land and Land Rights	$15,364.00	G	60.85%	$9,348.71	31.50%	$4,839.76	7.65%	$1,175.54
304	Structures and Improvements	$2,344.00	G	60.85%	$1,426.28	31.50%	$738.37	7.65%	$179.35
340	Office Furniture and Equipment	$10,751.00	G	60.85%	$6,541.78	31.50%	$3,386.63	7.65%	$822.59
341	Transportation Equipment	$20,270.00	G	60.85%	$12,333.91	31.50%	$6,385.18	7.65%	$1,550.91
343	Tools, Shop and Garage equipment	$751.00	G	60.85%	$456.97	31.50%	$236.57	7.65%	$57.46
347	Miscellaneous Equipment	$10,875.00	G	60.85%	$6,617.23	31.50%	$3,425.69	7.65%	$832.07
Total General Plant		$60,355.00							
TOTAL UTILITY PLANT IN SERVICE		**$2,237,201.00**		**60.85%**	**$1,361,294.78**	**31.50%**	**$704,732.30**	**7.65%**	**$171,173.91**
									$0.00
		$2,176,846.00		60.85%	$1,324,569.90	31.50%	$685,720.10	7.65%	$166,556.00

Depreciation Expense (1995)

			Alloc. Symbol	General Water %	General Water Amount	Fire Protection %	Fire Protection Amount	Customer Service %	Customer Service Amount
Source of Supply and Pumping Plant									
303	Land and Land Rights	$0.00	A	98.00%	$0.00	2.00%	$0.00	0.00%	$0.00
304	Structures and Improvements	$256.00	A	98.00%	$250.88	2.00%	$5.12	0.00%	$0.00
Total Supply and Pumping Plant		$256.00							
Water treatment Plant									
304	Structures and Improvements	$0.00	A	98.00%	$0.00	2.00%	$0.00	0.00%	$0.00
320	Water Treatment Equipment	$230.00	A	98.00%	$225.40	2.00%	$4.60	0.00%	$0.00
	New Treatment Plant	$9,188.00	A	98.00%	$9,004.24	2.00%	$183.76	0.00%	$0.00
Total Water treatment Plant		$9,418.00							
Transmission and Distribution Plant									
331	Transmission and Distribution Mains	$15,186.00	B	50.00%	$7,593.00	50.00%	$7,593.00	0.00%	$0.00
	Storage Reservoir	$3,062.00	E	33.33%	$1,020.56	66.67%	$2,041.44	0.00%	$0.00
333	Services	$1,619.00	C	0.00%	$0.00	0.00%	$0.00	100.00%	$1,619.00
334	Meters and Meter Installations	$3,872.00	C	0.00%	$0.00	0.00%	$0.00	100.00%	$3,872.00
335	Hydrants	$582.00	F	2.00%	$11.64	98.00%	$570.36	0.00%	$0.00
Total Transmission and Distribution		$24,321.00							
General Plant									
303	Land and Land Rights	$0.00	H	53.26%	$0.00	30.59%	$0.00	16.15%	$0.00
304	Structures and Improvements	$0.00	H	53.26%	$0.00	30.59%	$0.00	16.15%	$0.00
340	Office Furniture and Equipment	$1,101.00	H	53.26%	$586.39	30.59%	$336.77	16.15%	$177.84
341	Transportation Equipment	$1,449.00	H	53.26%	$771.74	30.59%	$443.22	16.15%	$234.05
343	Tools, Shop and Garage equipment	$0.00	H	53.26%	$0.00	30.59%	$0.00	16.15%	$0.00
347	Miscellaneous Equipment	$280.00	H	53.26%	$149.13	30.59%	$85.65	16.15%	$45.23
Total General Plant		$2,830.00							
TOTAL DEPRECIATION		**$36,825.00**		**53.26%**	**$19,612.98**	**30.59%**	**$11,263.91**	**16.15%**	**$5,948.11**

0.000 ck

		$33,995.00	H	53.26%	$18,105.72	30.59%	10,398.28	6.15%	$5,491.00

Summary - Total Revenue Requirements

		Alloc. Symbol	General Water %	General Water Amount	Fire Protection %	Fire Protection Amount	Customer Service %	Customer Service Amount
Operation & Maintenance	$113,537.00		74.84%	$84,972.70	18.09%	$20,542.46	7.07%	$8,021.84
Depreciation	$36,825.00		53.26%	$19,612.98	30.59%	$11,263.91	16.15%	$5,948.11
Taxes	$81,076.00	T	61.30%	$49,697.05	31.07%	$25,190.85	7.63%	$6,188.10
Return on Rate Base	$58,859.00		60.85%	$35,814.60	31.50%	$18,540.95	7.65%	$4,503.45
New Treatment Plant (Interest Expense)	$97,212.00	P	81.83%	$79,551.01	18.17%	$17,660.99	0.00%	$0.00
TOTALS	$387,509.00		69.59%	$269,648.34	24.05%	$93,199.16	6.36%	$24,661.50

0.000 ck

$2,600.00		74.84%	$1,945.88	18.09%	$470.42	7.07%	$183.70
$78,476.00		60.85%	$47,751.17	31.50%	$24,720.43	7.65%	$6,004.40
$81,076.00 0.000 ck	T	61.30%	$49,697.05	31.07%	$25,190.85	7.63%	$6,188.10
$245,000.00	E	33.33%	$81,658.50	66.67%	$163,341.50	0.00%	$0.00
$ 735,000.00	A	98.00%	$720,300.00	2.00%	$14,700.00	0.00%	$0.00
$ 980,000.00 0.000 ck	P	81.83%	$801,958.50	18.17%	$178,041.50	0.00%	$0.00

Allocation of Fire Protection Service Expenses

As discussed above, the provision of fire service involves both public fire protection (through public fire hydrants) and private fire protection (through sprinkler systems installed in individual properties or through privately owned hydrants). To calculate rates for each of these services, the total cost allocated to fire protection service must be further divided between public and private fire protection service.

Essentially, the Company provides fire service to its customers by providing sufficient supplies and capacity in the storage and distribution system so water can be drawn for fire fighting purposes on demand. The amount of service that can be drawn on is dependent on the size of the service, or how much water can be taken from the distribution system. Accordingly, the allocation between public and private fire service should be based on the number and size (capacity) of public and private fire services.

Schedule 5 on the following page presents the allocation of fire service expenses to public and private fire service. As noted, the equivalency factor used is based on the diameter of the connection to the 2.63 power to determine the flow capacity of each size service. This relationship is based on the HAZEN-Williams formula for flow in closed conduits. Hydrants were assumed to be connected through a six inch inlet opening.

From this Schedule it can be seen that public fire protection service will be allocated 81.7% of the total fire service cost, or $76,099. Similarly, private fire protection service will be allocated the balance - $17,100 or 18.3% which will be spread among the various private services.

Since public fire service is provided through a number of hydrants all with similar connection sizes, the public fire service allocation may be collected through a flat charge per hydrant. The current rate structure for public fire protection includes both a flat charge per hydrant plus an inch-foot charge. This latter charge is, in principal, designed to recover a portion of the investment in the whole distribution piping system (mains 6 inches and greater in diameter) needed to support fire flow conditions. The private fire protection service costs are collected based on the relative size of each customer's service connection.

	Allocation of Fire Protection Costs to Public and Private Fire Service						
			Number	Equiv.	Number of	%	Revenue
Public Fire Service				Factor	Equiv.'s		Required
	Hydrants	6"	65	111.31	7,235	81.65%	**$76,098.71**
Private Fire Service							
	Service size						
		4"	1	38.32	38		
		6"	10	111.31	1,113		
		8"	2	237.21	474		
	Total Private				1,626	18.35%	**$17,100.45**
TOTAL					8,861		
						100.00%	**$93,199.16**
						ck	0.000

Allocation of Customer Service Expenses

The customer service expenses include services related to (1) billing, collection and meter reading and (2) the provision and maintenance of meters and services. The total customer service cost must be further allocated to each of these two types of customer services in order to calculate new service charges.

Schedules 6 and 7 present the allocation of the customer service costs to meter and service related costs and to billing related costs, respectively. In all cases, those costs related to customer meter or service lines are allocated to the meter/service component (allocation symbol AA). Billing, collection and meter reading costs are allocated to the billing component (symbol BB). Associated overhead and administrated costs are allocated based on all other operating costs (symbol CC).

The portion of these costs allocated to the meter and service function is $18,648 (75.6%), and to the billing and collection function is $6,013 (24.4 %).

Allocation of O & M Customer Service Expenses

			Alloc. Symbol	Meter/Service %	Meter/Service Amount	Billing & Coll. %	Billing & Coll. Amount
Pumping Expenses							
	Operations						
623	Fuel or Power Purchased for pumping	$0.00			$0.00		$0.00
	Maintenance						
631	Maintenance of Structures and Improvements	$0.00			$0.00		$0.00
Total Pumping Expenses		$0.00					
Water Treatment Expenses							
	Operations						
640	Operation Supervision and Engineering	$0.00			$0.00		$0.00
641	Chemicals	$0.00			$0.00		$0.00
642	Operation Labor and Expenses	$0.00			$0.00		$0.00
643	Miscellaneous Expenses	$0.00			$0.00		$0.00
	O&M Expense - New Treatment Plant	$0.00			$0.00		$0.00
	Total Water Treatment Expenses	$0.00					
Transmission and Distribution Expenses							
	Operations						
660	Operation Supervision and Engineering	$0.00			$0.00		$0.00
662	Transmission and Distribution Lines Expense	$0.00			$0.00		$0.00
663	Meter Expenses	$0.00	AA	100.00%	$0.00	0.00%	$0.00
664	Customer Installations Expense	$30.00	AA	100.00%	$30.00	0.00%	$0.00
665	Miscellaneous Expenses	$0.00			$0.00		$0.00
666	Rents	$0.00					
	Total Operations	$30.00					
	Maintenance						
671	Maintenance of Structures and Improvements	$0.00			$0.00		$0.00
	Maintenance of Storage Facilities						
673	Maintenance Transmission and Distribution Lines Exp.	$0.00			$0.00		$0.00
674	Maintenance of Fire Mains	$0.00			$0.00		$0.00
675	Maintenance of Services	$230.00	AA	100.00%	$230.00	0.00%	$0.00

676	Maintenance of Meters	$1,302.00	AA	100.00%	$1,302.00	0.00%	$0.00
677	Maintenance of Hydrants	$0.00			$0.00		$0.00
678	Maintenance of Miscellaneous Equipment	$0.00			$0.00		$0.00
	Total Maintenance	$1,532.00					
Total Transmission and Distribution Expenses		$1,562.00					
Customer Accounts Expense							
	Operation						
902	Meter Reading Expense	$1,240.00	BB	0.00%	$0.00	100.00%	$1,240.00
903	Customer Records and Collection Exps.	$2,727.00	BB	0.00%	$0.00	100.00%	$2,727.00
904	Uncollectable Accounts	$289.00	BB	0.00%	$0.00	100.00%	$289.00
Total Customer Accounts Expense		$4,256.00					
Administrative and General Expenses							
	Operation						
920	Administrative and General Salaries	$842.27	CC	26.85%	$ 226.13	73.15%	$ 616.14
921	Office Supplies and Other Expenses	$262.20	CC	26.85%	$ 70.39	73.15%	$ 191.80
923	Outside Services Employed	$486.10	CC	26.85%	$ 130.51	73.15%	$ 355.59
	Property Insurance	$357.58	CC	26.85%	$ 96.00	73.15%	$ 261.58
925	Injuries and Damages	$0.00	CC	26.85%	$0.00	73.15%	$0.00
	Regulatory Commission Expenses	$51.72	CC	26.85%	$ 13.89	73.15%	$ 37.83
930	Miscellaneous General Expenses	$76.80	CC	26.85%	$ 20.62	73.15%	$ 56.18
931	General Rents	$127.18	CC	26.85%	$ 34.14	73.15%	$ 93.03
Total Administrative and General Salaries		$2,203.84					
Total Customer Service Expenses		$8,021.84		26.85%	$2,153.68	73.15%	$5,868.16
						ck	0.000
		$5,818.00	CC	26.85%	$1,562.00	73.15%	$4,256.00

Allocation of Customer Service Expenses

		Alloc. Symbol	Meter/Service %	Meter/Service Amount	Billing & Coll. %	Billing & Coll. Amount
Operation & Maintenance	$8,021.84		26.85%	$2,153.68	73.15%	$5,868.16
Depreciation	$5,948.11	AA	100.00%	$ 5,948.11	0.00%	$0.00
Taxes	$6,188.10	TT	97.65%	$ 6,042.93	2.35%	$145.17
Return on Rate Base	$4,503.45	AA	100.00%	$ 4,503.45	0.00%	
New Treatment Plant	$0.00		0.00%	$0.00	0.00%	
TOTALS	$24,661.50		75.62%	$18,648.17	24.38%	$6,013.32
	0.000 ck					
	$ 2,600.00	CC	26.85%	$ 698.04	73.15%	$ 1,901.96
	$ 78,476.00	AA	100.00%	$ 78,476.00	0.00%	$
	$ 81,076.00	TT	97.65%	$ 79,174.04	2.35%	$ 1,901.96
	0.000 ck					

Allocation of General Water Service Expenses

As with fire protection service and customer service expenses, general water service expenses must also be further allocated to determine rates. Schedules 8 through 11 present the allocation of these expenses to base or average use and to excess or peak demands.

As shown on these schedules, general water service costs are allocated to factors related to meeting average or base demands and those that are associated with capacity for meeting peak demands. The allocation of O&M costs (Schedule 8) generally follows that used for allocating the total costs between general service and fire protection service. Schedules 9 and 10 present the allocation of general service plant and depreciation expenses to base and peak demand costs. Schedule 11 contains a summary of all of these calculations. The total allocated to the base or average use is $175,327 (65%), and to peak demands is 94,322 (35%).

The basis of each allocation corresponds to an allocation symbol shown on schedules 8, 9 and 10, and each is described below:

* Symbol aa - Expense items corresponding to this symbol are associated with the provision of base or average demand service, and are allocated 100% to base use.

* Symbol bb - This symbol is associated with expense items that are designed or operated to meet average and peak demands They were allocated 66.67% to base and 33.33% to peak use based on the following system demands.

Maximum Day Demand	300,000 Gals.	100.00%
Average Day Demand	200,000 Gals.	66.67%
. Max. Day Increment	100,000 Gals.	33.33%

* Symbol cc - These expenses are related 100% to satisfying peak demands.

* Symbol dd - This symbol is associated with general and administrative operating expenses which could not be directly allocated. Accordingly, these costs were allocated 65.2% to base or average demands, and 34.8% to peak demands, based on all other general water service operating expenses that could be directly allocated.

* Symbol ee - This symbol is associated with plant investments in general water facilities which could not be directly allocated. Accordingly, these costs were allocated 63.6% to base or average demands, and 36.4% to peak demands,

based on all other plant investments in general water facilities that could be directly allocated.

* Symbol ff - This symbol is associated with depreciation expenses which could not be directly allocated. Accordingly, these costs were allocated 63.4% to to base or average use, and 36.6% to peak use based on all other depreciation expenses that could be directly allocated.

Pittsfield Aqueduct Company

Schedule 8

Allocation of General Service O&M Costs

			Alloc. Symbol	Base/Avg. Use %	Amount	Peak Demands %	Amount
Pumping Expenses							
	Operations						
623	Fuel or Power Purchased for pumping	$269.50	aa	100.00%	$269.50	0.00%	$0.00
	Maintenance						
631	Maintenance of Structures and Improvements	$0.00	aa	100.00%	$0.00	0.00%	$0.00
Total Pumping Expenses		$269.50					
Water Treatment Expenses							
	Operations						
640	Operation Supervision and Engineering	$4,456.06	bb	66.67%	$2,970.86	33.33%	$1,485.20
641	Chemicals	$3,935.68	bb	66.67%	$2,623.92	33.33%	$1,311.76
642	Operation Labor and Expenses	$1,678.74	bb	66.67%	$1,119.22	33.33%	$559.52
643	Miscellaneous Expenses	$1,652.28	bb	66.67%	$1,101.58	33.33%	$550.70
	O&M Expense - New Treatment Plant	$37,249.80	bb	66.67%	$24,834.44	33.33%	$12,415.36
	Total Water Treatment Expenses	$48,972.56					
Transmission and Distribution Expenses							
	Operations						
660	Operation Supervision and Engineering	$4,640.00	bb	66.67%	$3,093.49	33.33%	$1,546.51
662	Transmission and Distribution Lines Expense	$671.00	bb	66.67%	$447.36	33.33%	$223.64
663	Meter Expenses	$0.00		100.00%	$0.00	0.00%	$0.00
664	Customer Installations Expense	$0.00		100.00%	$0.00	0.00%	$0.00
665	Miscellaneous Expenses	$0.00			$0.00		$0.00
666	Rents	$0.00					
	Total Operations	$5,311.00					
	Maintenance						
671	Maintenance of Structures and Improvements	$55.50	bb	66.67%	$37.00	33.33%	$18.50
	Maintenance of Storage Facilities	$1,463.19	cc	0.00%	$0.00	100.00%	$1,463.19
673	Maintenance Transmission and Distribution Lines Exp.	$5,555.50	bb	66.67%	$3,703.85	33.33%	$1,851.65
674	Maintenance of Fire Mains	$0.00			$0.00		$0.00

675	Maintenance of Services	$0.00		100.00%	$0.00	0.00%	$0.00
676	Maintenance of Meters	$0.00		100.00%	$0.00	0.00%	$0.00
677	Maintenance of Hydrants	$0.92	aa	100.00%	$0.92	0.00%	$0.00
678	Maintenance of Miscellaneous Equipment	$0.00			$0.00		$0.00
	Total Maintenance	$7,075.11					
Total Transmission and Distribution Expenses		$12,386.1					
Customer Accounts Expense							
	Operation						
902	Meter Reading Expense	$0.00		0.00%	$0.00	100.00%	$0.00
903	Customer Records and Collection Exps.	$0.00		0.00%	$0.00	100.00%	$0.00
904	Uncollectable Accounts	$0.00		0.00%	$0.00	100.00%	$0.00
Total Customer Accounts Expense		$0.00					
Administrative and General Expenses							
	Operation						
920	Administrative and General Salaries	$8,921.85	dd	65.23%	$5,820.02	34.77%	$3,101.83
921	Office Supplies and Other Expenses	$2,777.37	dd	65.23%	$1,811.77	34.77%	$965.60
923	Outside Services Employed	$5,149.09	dd	65.23%	$3,358.92	34.77%	$1,790.17
	Property Insurance	$3,787.72	dd	65.23%	$2,470.86	34.77%	$1,316.86
925	Injuries and Damages	$0.00	dd	65.23%	$0.00	34.77%	$0.00
	Regulatory Commission Expenses	$547.84	dd	65.23%	$357.37	34.77%	$190.47
930	Miscellaneous General Expenses	$813.53	dd	65.23%	$530.69	34.77%	$282.84
931	General Rents	$1,347.15	dd	65.23%	$878.79	34.77%	$468.36
Total Administrative and General Salaries		$23,344.54					
Total General Service O&M Costs		$84,972.70		65.23%	$55,430.55	34.77%	$29,542.15
		0.000 ck					
		$61,628.17	dd	65.23%	$40,202.12	34.77%	$21,426.04

Allocation of General Water Plant Investment (Dec. 31, 1995)

			Alloc. Symbol	Base/Average Use %	Base/Average Use Amount	Peak Demands %	Peak Demands Amount
Source of Supply and Pumping Plant							
303	Land and Land Rights	$28,239.68	aa	100.00%	$28,239.68	).00%	$0.00
304	Structures and Improvements	$12,898.76	aa	100.00%	$12,898.76	).00%	$0.00
Total Supply and Pumping Plant		$41,138.44					
Water treatment Plant							
304	Structures and Improvements	$6,419.00	bb	66.67%	$4,279.55	33.33%	$2,139.45
320	Water Treatment Equipment	$10,657.50	bb	66.67%	$7,105.36	33.33%	$3,552.14
	New Treatment Plant	$720,300.00	bb	66.67%	$480,224.01	33.33%	$240,075.99
Total Water treatment Plant		$737,376.50					
Transmission and Distribution Plant							
331	Transmission and Distribution Mains	$463,519.50	bb	66.67%	$309,028.45	33.33%	$154,491.05
	Storage Reservoir	$81,658.50	cc	0.00%	$0.00	100.00%	$81,658.50
333	Services	$0.00		0.00%	$0.00	0.00%	$0.00
334	Meters and Meter Installations	$0.00		0.00%	$0.00	0.00%	$0.00
335	Hydrants	$876.96	aa	100.00%	$876.96	0.00%	$0.00
Total Transmission and Distribution		$546,054.96					
General Plant							
303	Land and Land Rights	$9,348.71	ee	63.62%	$5,947.37	36.38%	$3,401.33
304	Structures and Improvements	$1,426.28	ee	63.62%	$907.36	36.38%	$518.92
340	Office Furniture and Equipment	$6,541.78	ee	63.62%	$4,161.69	36.38%	$2,380.09
341	Transportation Equipment	$12,333.91	ee	63.62%	$7,846.48	36.38%	$4,487.44
343	Tools, Shop and Garage equipment	$456.97	ee	63.62%	$290.71	36.38%	$166.26
347	Miscellaneous Equipment	$6,617.23	ee	63.62%	$4,209.69	36.38%	$2,407.54
Total General Plant		$36,724.88					
TOTAL GENERAL UTILITY PLANT IN SERVICE		$1,361,294.78		63.62%	$866,016.06	36.38%	$495,278.72
		$1,324,569.90	ee	63.62%	$842,652.76	36.38%	$481,917.14

Allocation of General Depreciation Expense (Dec. 31, 1995)

			Alloc. Symbol	Base/Average Use %	Base/Average Use Amount	Peak Demands %	Peak Demands Amount
Source of Supply and Pumping Plant							
303	Land and Land Rights	$0.00	aa	100.00%	$0.00	0.00%	$0.00
304	Structures and Improvements	$250.88	aa	100.00%	$250.88	0.00%	$0.00
Total Supply and Pumping Plant		$250.88					
Water treatment Plant							
304	Structures and Improvements	$0.00	bb	66.67%	$0.00	33.33%	$0.00
320	Water Treatment Equipment	$225.40	bb	66.67%	$150.27	33.33%	$75.13
	New Treatment Plant	$9,004.24	bb	66.67%	$6,003.13	33.33%	$3,001.11
Total Water treatment Plant		$9,229.64					
Transmission and Distribution Plant							
331	Transmission and Distribution Mains	$7,593.00	bb	66.67%	$5,062.25	33.33%	$2,530.75
	Storage Reservoir	$1,020.56	cc	0.00%	$0.00	100.00%	$1,020.56
333	Services	$0.00		0.00%	$0.00	0.00%	$0.00
334	Meters and Meter Installations	$0.00		0.00%	$0.00	0.00%	$0.00
335	Hydrants	$11.64	aa	100.00%	$11.64	0.00%	$0.00
Total Transmission and Distribution		$8,625.20					
General Plant							
303	Land and Land Rights	$0.00	ff	63.40%	$0.00	36.60%	$0.00
304	Structures and Improvements	$0.00	ff	63.40%	$0.00	36.60%	$0.00
340	Office Furniture and Equipment	$586.39	ff	63.40%	$371.74	36.60%	$214.65
341	Transportation Equipment	$771.74	ff	63.40%	$489.24	36.60%	$282.49
343	Tools, Shop and Garage equipment	$0.00	ff	63.40%	$0.00	36.60%	$0.00
347	Miscellaneous Equipment	$149.13	ff	63.40%	$94.54	36.60%	$54.59
Total General Plant		$1,507.26					
TOTAL GENERAL DEPRECIATION EXPENSE		$19,612.98		63.40%	$12,433.70	36.60%	$7,179.28
		$18,105.72	ff	63.40%	$11,478.17	36.60%	$6,627.55

Summary Allocation of General Service Costs

		Alloc. Symbol	Base/Average Use %	Base/Average Use Amount	Peak Demands %	Peak Demands Amount
Operation & Maintenance	$84,972.70		65.23%	$55,430.55	34.77%	$29,542.15
Depreciation	$19,612.98		63.40%	$12,433.70	36.60%	$7,179.28
Taxes	$49,697.05	tt	63.67%	$31,641.57	36.33%	$18,055.48
Return on Rate Base	$35,814.60		63.62%	$22,784.20	36.38%	$13,030.39
New Treatment Plant (Interest Expense)	$79,551.01	bb	66.67%	$53,036.66	33.33%	$26,514.35
TOTALS	**$269,648.34**		**65.02%**	**$175,326.68**	**34.98%**	**$94,321.65**
	0.000 ck					

	$ 2,600.00		65.23%	$1,696.07	34.77%	$903.93
	$ 78,476.00		63.62%	$49,924.14	36.38%	$28,551.86
	$ 81,076.00	tt	63.67%	$51,620.21	36.33%	$29,455.79
	0.000 ck					

UNITS OF SERVICE

To calculate new rates and charges it is necessary to first determine the units of service provided or the number of meters and hydrants or number of cubic feet of water sales that the rates and charges will be applied to. These units of service are also commonly referred to as billing determinants. This is necessary not only to calculate the new rates, but also to check the calculations to ensure that the revenues derived therefrom will be adequate.

Fire Service

Fire service charges are currently comprised, and will continue to be in the future, of two components. The first component which is normally referred to as an 'inch-foot" charge is designed to recover the portion of fire protection costs related to the investment in distribution mains and pipes. It is a unit charge per foot of pipe for all mains that are six inches or larger in diameter within a community. In this case there is only one community, but typically, costs are spread between communities in relation to the proportion of such pipe in each community. Total collections from each community assigned would vary annually based on the net additions of pipe each year. The second component is a hydrant charge, which is designed to recover all remaining costs from a per hydrant charge or an equivalent service charge for private fire services.

For the latter component the units of service are the number of hydrants and number of private sprinkler connections of each size. Schedule 5 presented the number of public fire hydrants and the number of private sprinkler systems by size. The number of inch-feet of pipe (6 inches and larger) as of December 31, 1995 was computed for each pipe size along with the total for all sizes is shown on Schedule 12.

Meters and Billings

To determine service charges using the customer service allocations, it is necessary to determine the number of meters by size as well as the number of billings. Schedule 13 presents the number of meters by size and the number of billings. The first - (1) - meter equivalency factor presented on this schedule are used to equate all meters and services to a typical 5/8 inch meter installation. Because the meter and service customer costs that will be spread over the number of equivalent meters are designed to recover meter and service installation and maintenance costs, the equivalency factors are based on the relative costs of furnishing and installing various size meters and services. These factors were derived primarily from factors used in computing current charges tempered by engineering judgment and industry norms for similar systems. The second - (2) - meter equivalency factor is based on the relative flow capacity of each meter size and is used to allocate any demand related costs that are included in the customer service charges (rather than consumption charges). The demand costs computed and summarized on Schedule 11 are

recovered in this manner. Because these costs are for the most part fixed costs that do not vary with use, recovery in this manner is preferred to adding them to all base or average use costs.

Metered Water Sales

The last unit of service is the metered water consumption or sales. Because the Company has in the past and plans to continue applying a uniform consumption charge to all users, it was not necessary to determine the level of sales by rate block or customer class. Total water sales have been relatively flat in recent years. Total billed consumption for each of the past three years is listed below in cubic feet (CF):

1993	7,638,747 CF
	7,650,855 CF
	7,193,864 CF

A straight average of these three years is 7,494,489 CF. Thus, for rate design purposes a rounded figure of 7,500,000 CF or 75,000 HCF (100 CF) was used.

Transmission and Distribution Mains

Size (inches)	Cast Iron	PVC	Transite	Cement	Galv. Steel	Copper		Total by Size		Size (inches)	Inch-Feet
1						85		85			
1.5	357				1,023			1,380			
2	232	452						684			
3					413			413			
4	654		100	876				1,630			
6	25,337			1,464				26,801		6	160,806
8	28,384			2,325				30,709		8	245,672
10	2,967			852				3,819			38,190
12	3,350							3,350			40,200
								-			
TOTAL	61,281	452	100	5,517	1,436	85		68,871	0.0000		**484,868**

Number of Bills and Meter Equivalents

Meter Size	Number of Customers	Number of Bills	Meter Equiv. Factor (1)	Number Meter Equiv. (1)	Percent	Meter Equiv. Factor (2)	Number Meter Equiv. (2)	Percent
5/8 Inch	544	2176	1.0	544	77.67%	1.0	544	66.50%
3/4 Inch	4	16	1.4	5.6	0.80%	1.5	6	0.73%
1 inch	16	64	1.8	28.8	4.11%	2.5	40	4.89%
1.5 inch	14	56	2.5	35	5.00%	5.0	70	8.56%
2 inch	12	48	3.5	42	6.00%	8.0	96	11.74%
3 inch	2	8	6.5	13	1.86%	15.0	30	3.67%
4 inch	0	0	10.0	0	0.00%	25.0	0	0.00%
6 inch	0	0	20.0	0	0.00%	50.0	0	0.00%
8 inch	0	0	40.0	0	0.00%	80.0	0	0.00%
	592	2368						
Unmetered	32	128	1	32	4.57%	1	32	3.91%
Total	624	2496		700.4	100.00%		818	100.00%

RATE CALCULATIONS

The final step in the rate calculation process is the determination of new rates and charges using the allocated cost of service. The cost allocations that form the basis for the rate determinations were presented above. While cost of service is a key factor in the design of new rates and charges, it should not be the only consideration involved in setting rates and charges. Factors such as customer impacts, rate continuity, impact on water conservation, revenue sufficiency and regulatory requirements should also be considered.

Current Rates and Charges

Because rate continuity is a key factor in designing new rates and charges, it is necessary to understand the existing rate structure. Schedule 14 presents the currently approved rates.

Service Charges

The proposed service charge consists of three components. The first component is the billing charge based on the cost to read meters and send and collect bills. The second component relates to the cost of meters and services. The third component is designed to recover all demand costs (Schedule 11) that are not recovered from the consumption charge.

Billing Charge

The cost of billing is the same for all meter sizes. To determine this component of the service charge, the allocation to billing is divided by the total number of bills. The allocation to this component was presented earlier on Schedule 7. The total number of bills includes all that are sent to water service customers as well as the number of public and private fire service bills, The charge is determined by dividing the allocated costs by the number of bills as follows:

$$\frac{\text{Billing Cost Allocation}}{\text{Number of Billings}} = \frac{\$6{,}013.32}{2{,}496} = \$2.41 \text{ per Billing}$$

Meter/Service Charge

The meter and service charge component of the service charge, unlike the billing component, varies by the size of the meter. As presented in Schedule 13, larger meter sizes are more costly to install and maintain. Unlike the billing component, this charge does not depend on billing frequency. This component is computed by dividing the

meter/service customer component (Schedule 7) by the number of factor (1) meter equivalents.

$$\frac{\text{Meter/Service Allocation}}{\text{Number of Equiv. (1) Meters}} = \frac{\$18{,}648.17}{700.4} = \$26.62 \text{ per Equiv. Meter}$$

Demand Charge

The last component of the service charge is designed to recover the demand or fixed cost component of General Service costs (Schedule 11). The Company had previously recovered at least a portion of these costs through the uniform consumption charge. However, because these costs are closely related to system demand it is preferable to base the charge on a customer's potential demand or the relative capacity of their meter/service. This component is computed by dividing the "Peak Demands" portion of General Service Costs (Schedule 11) by the number of factor (2) meter equivalents.

$$\frac{\text{Peak Demands Allocation}}{\text{Number of Equiv. (2) Meters}} = \frac{\$94{,}321.65}{818} = \$115.31 \text{ per Equiv. Meter}$$

Summary - Service Charges

Schedule 15 presents a summary of the proposed service charges based on the calculations specified above. Since all accounts are billed quarterly, the total charge is determined by adding the billing charge plus one-fourth of the meter/service charge plus one-fourth of the demand charge. Charges for other meter sizes are determined in a similar manner, except that the meter/service and the demand charges must be multiplied by the appropriate meter equivalency factor for all meters larger than 5/8 inch.

Fire Service Charges

Public Fire Service

As discussed in the previous section of the report, public fire service charges consist of two components for the Pittsfield Aqueduct Company. The first component, referred to as the inch-foot charge, is computed by dividing the portion of fire protection costs that are directly related to the company's investment in distribution mains and pipes by the total inch-feet of mains on the system that are six inches and larger in diameter. This

investment is determined by computing the percentage of all fire protection costs that are directly related to the distribution system piping. Thus, the inch-foot charge was computed as follows:

$$\frac{\text{Distr. System Fire Protection Costs}}{\text{Total Inch-Feet of mains 6" \& larger}} = \frac{\$43,148}{484,868} = \$0.08899 \text{ per Inch-Foot}$$

The applicable quarterly charge is one-fourth of this amount or $0.02225 per Inch-Foot. The remainder of the cost allocated to public fire service are divided by the number of fire hydrants to determine a charge per hydrant as follows:

$$\frac{\text{Balance of Fire Protection Costs}}{\text{Number of Public Fire Hydrants}} = \frac{\$32,951}{65} = \$506.94 \text{ per Hydrant}$$

Thus, the total quarterly charge for hydrants equals $126.73 ($506.94/4) times the number of hydrants plus one billing charge of $2.41.

Private Fire Service

Private fire charge are calculated by using the equivalency factors presented in Schedule 5. A unit charge per service size equivalent is calculated by dividing the costs allocated to private fire service (Schedule 5) by the total number of equivalents as follows:

$$\frac{\text{Private Fire Protection Costs}}{\text{Number of Service Equivalents}} = \frac{\$17,100}{1,626} = \$10.52 \text{ per Equivalent}$$

To determine the charge by service size this unit charge is multiplied by the number of equivalencies per service size. Thus, the quarterly charge for a 6 inch service equals $292.75 ($10.52 x 111.31/4) plus a billing charge of $2.41 for a total charge of $295.16. Quarterly charges for the other service sizes are derived in an analogous manner. Based on this method, the quarterly fire charges per service size are summarized as follows:

Service Size	Quarterly Fire Charge
4 Inch	$103.19
6 Inch	$295.16
8 Inch	$626.27

Consumption Charge

The last rate component to be calculated is the consumption charge or metered water rate. The Company has historically used a uniform consumption charge to recover those costs not recovered from fire protection charges and fixed customer charges. Uniform consumption charges have been adopted by many water utilities and are generally viewed within the industry as being efficient, equitable for all customers, and at least not counter to conservation goals. It is the Company's preference at this time to continue with such a charge. To calculate a uniform metered water rate, the costs allocated to general water service (Schedule 11) are simply divided by the total metered water sales. In this case, the uniform rate was calculated as follows:

$$\frac{\text{Base General Water Costs}}{\text{Annual Billed Consumption}} = \frac{\$175{,}326.68}{75{,}000\ \text{HCF}} = \$2.3377 \text{ per HCF}$$

Summary

The proposed water rates are summarized and presented on Schedule 16. These can be easily compared with the current rates as shown on Schedule 14. The remaining sections provide a comparison of typical bills before and after the proposed increase, a comparison with charges currently billed by several other water utilities in the New Hampshire, and a proof of revenues tabulation.

CURRENT RATES - QUARTERLY

General Service - Metered

Meter Size	"Customer Charge" Minimum Charge	"Consumption Charge" All Use
5/8 Inch	$11.67	$ 1.156 per 100 CF
3/4 Inch	$11.67	
1 inch	$11.67	
1.5 inch	$23.58	
2 inch	$38.64	
3 inch	$73.93	
4 inch	$131.03	
6 inch	$294.40	
8 inch	$530.27	

Fire Protection - Municipal

Hydrant Charge

$ 52.53 per Hydrant per Quarter

Inch-foot Charge

$ 0.0325 per Inch-Foot per Quarter

Fire Protection - Non-Municipal

Charge per Connection

Service Size	
4 Inch	$ 137.53 per Quarter
6 Inch	$ 300.89 per Quarter
8 Inch	$ 536.77 per Quarter

Quarterly Service Charges

Meter Size	Billing Charge	Meter & Service charge	Capacity Charge	Total Quarterly Charge
5/8 Inch	$2.41	$6.65	$28.83	$37.89
3/4 Inch	$2.41	$9.31	$43.25	$54.97
1 inch	$2.41	$11.97	$72.08	$86.46
1.5 inch	$2.41	$16.63	$144.15	$163.19
2 inch	$2.41	$23.28	$230.64	$256.33
3 inch	$2.41	$43.23	$432.45	$478.09
4 inch	$2.41	$66.50	$720.75	$789.66
6 inch	$2.41	$133.00	$1,441.50	$1,576.91
8 inch	$2.41	$266.00	$2,306.40	$2,574.81

PROPOSED RATES - QUARTERLY

General Service - Metered

Meter Size	"Customer Charge" Minimum Charge	"Consumption Charge" All Use
5/8 Inch	$37.89	$ 2.3377 per 100 CF
3/4 Inch	$54.97	
1 inch	$86.46	
1.5 inch	$163.19	
2 inch	$256.33	
3 inch	$478.09	
4 inch	$789.66	
6 inch	$1,576.91	
8 inch	$2,574.81	

Fire Protection - Municipal

Hydrant Charge

$ 126.73 per Hydrant per Quarter

Inch-foot Charge

$0.02225 per Inch-Foot per Quarter

Fire Protection - Non-Municipal

Charge per Connection

Service Size	
4 Inch	$ 103.19 per Quarter
6 Inch	$ 295.16 per Quarter
8 Inch	$ 626.27 per Quarter

Typical Bill Impacts

Schedule 17 shows the customer bill impacts for a range of usage levels between 15 HCF per quarter (5/8 inch meter) to 1,500 HCF per quarter (3 inch meter). Both current charges under existing rates and new charges under proposed rates are provided, along with both the dollar increase and percentage increase.

Figure 1 graphically displays the proposed annual charges to a residential customer in Pittsfield (M - $465) in comparison with charges for the same usage level (33.5 HCF per quarter) to residential customers in 15 other communities in New Hampshire. The proposed rates for Pittsfield would put them toward the high end of the range for this group. The range is from $231 to $688, and the average is $406. Six of the 15 comparison communities have charges exceeding $400 per year.

A proof of revenues is provided on schedule 18.

TYPICAL BILL IMPACTS

Quarterly Bills

General Water Service

Meter Size	Usage (HCF)	Current Bill	New Bill	Increase ($)	Increase (%)
5/8 Inch	15	$29.01	$72.96	$43.95	151.5%
	20	$34.79	$84.64	$49.85	143.3%
	25	$40.57	$96.33	$55.76	137.4%
	30	$46.35	$108.02	$61.67	133.1%
	35	$52.13	$119.71	$67.58	129.6%
	40	$57.91	$131.40	$73.49	126.9%
	45	$63.69	$143.09	$79.40	124.7%
	50	$69.47	$154.78	$85.31	122.8%
1 Inch	50	$69.47	$203.35	$133.88	192.7%
	100	$127.27	$320.23	$192.96	151.6%
	150	$185.07	$437.12	$252.05	136.2%
	200	$242.87	$554.00	$311.13	128.1%
2 Inch	200	$269.84	$723.87	$454.03	168.3%
	300	$385.44	$957.64	$572.20	148.5%
	400	$501.04	$1,191.41	$690.37	137.8%
	500	$616.64	$1,425.18	$808.54	131.1%
3 Inch	500	$651.93	$1,646.94	$995.01	152.6%
	750	$940.93	$2,231.37	$1,290.44	137.1%
	1,000	$1,229.93	$2,815.79	$1,585.86	128.9%
	1,500	$1,807.93	$3,984.64	$2,176.71	120.4%

Fire Protection Service

Public				
Hydrant charge	$52.53	$126.73	$74.20	141.3%
Inch-Foot Charge	$0.0325	$0.02225	($0.0103)	-31.5%
Private				
4 Inch Connection	137.53	103.19	($34.34)	-25.0%
6 Inch Connection	300.89	295.16	($5.73)	-1.9%
8 Inch Connection	536.77	626.27	$89.50	16.7%

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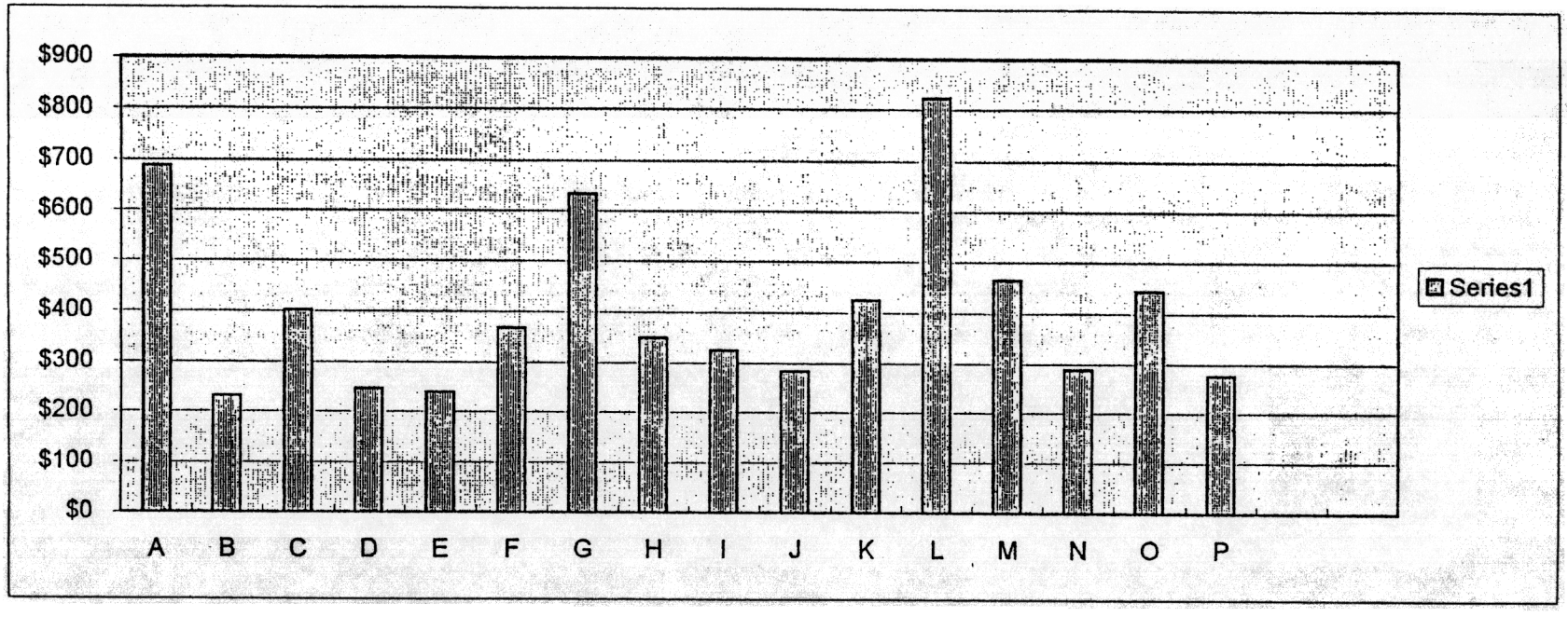

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PROOF OF REVENUES

Service Charges				
Meter Size	Number of Bills		Quarterly Charge	Total
5/8 Inch	2176		$37.89	$82,448.64
3/4 Inch	16		$54.97	$879.44
1 inch	64		$86.46	$5,533.12
1.5 inch	56		$163.19	$9,138.36
2 inch	48		$256.33	$12,303.60
3 inch	8		$478.09	$3,824.68
4 inch	0		$789.66	$0.00
6 inch	0		$1,576.91	$0.00
8 inch	0		$2,574.81	$0.00
				$114,127.84
	2,368			
	128		$37.89	$4,849.92
	2,496			
Consumption Charges				
	75,000		$2.3377	$175,327.50
Fire Protection Charges				
	Public			
		65	$506.92	$32,949.80
		484,868	$0.0890	$43,148.40
	4		$2.41	$9.64
	Private			
4 Inch	1		$412.76	$412.76
6 Inch	10		$1,180.64	$11,806.40
8 Inch	2		$2,505.08	$5,010.16
		Total Billed revenues		$387,642.42
		Revenue requirement		$387,509.00
			Difference	$133.42
			% Difference	0.0344%

EXHIBIT NO. DFR-3

NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION

PITTSFIELD AQUEDUCT COMPANY

DOCKET NO. DR 97 - ___

REVISED SCHEDULES TO THE COSS

PREPARED BY

DAVID F. RUSSELL, P.E.

Allocation of Fire Protection Costs to Public and Private Fire Service							
			Number	Equiv.	Number of	%	Revenue
Public Fire Service				Factor	Equiv.'s		Required
	Hydrants	6"	65	111.31	7,235	81.65%	$94,922.70
Private Fire Service							
	Service size						
		4"	1	38.32	38		
		6"	10	111.31	1,113		
		8"	2	237.21	474		
	Total Private				1,626	18.35%	**$21,330.47**
TOTAL					8,861		
						100.00%	**$116,253.16**
						ck	0.000

PROPOSED RATES - QUARTERLY

General Service - Metered

Meter Size	"Customer Charge" Minimum Charge	"Consumption Charge" All Use
5/8 Inch	$23.47	$ 2.6590 per 100 CF
3/4 Inch	$33.34	
1 inch	$50.41	
1.5 inch	$91.09	
2 inch	$140.97	
3 inch	$261.79	
4 inch	$429.16	
6 inch	$855.91	
8 inch	$1,421.21	

Fire Protection - Municipal

Hydrant Charge

$ 158.08 per Hydrant per Quarter

Inch-foot Charge

$0.02775 per Inch-Foot per Quarter

Fire Protection - Non-Municipal

Charge per Connection

Service Size		
4 Inch	$ 128.10	per Quarter
6 Inch	$ 367.51	per Quarter
8 Inch	$ 780.46	per Quarter

TYPICAL BILL IMPACTS					
		Quarterly Bills			
General Water Service					
Meter Size	Usage (HCF)	Current Bill	New Bill	Increase ($)	Increase (%)
5/8 Inch	15	$29.01	$63.36	$34.35	118.4%
	20	$34.79	$76.65	$41.86	120.3%
	25	$40.57	$89.95	$49.38	121.7%
	30	$46.35	$103.24	$56.89	122.7%
	35	$52.13	$116.54	$64.41	123.5%
	40	$57.91	$129.83	$71.92	124.2%
	45	$63.69	$143.13	$79.44	124.7%
	50	$69.47	$156.42	$86.95	125.2%
1 Inch	50	$69.47	$183.36	$113.89	163.9%
	100	$127.27	$316.31	$189.04	148.5%
	150	$185.07	$449.26	$264.19	142.8%
	200	$242.87	$582.21	$339.34	139.7%
2 Inch	200	$269.84	$672.77	$402.93	149.3%
	300	$385.44	$938.67	$553.23	143.5%
	400	$501.04	$1,204.57	$703.53	140.4%
	500	$616.64	$1,470.47	$853.83	138.5%
3 Inch	500	$651.93	$1,591.29	$939.36	144.1%
	750	$940.93	$2,256.04	$1,315.11	139.8%
	1,000	$1,229.93	$2,920.79	$1,690.86	137.5%
	1,500	$1,807.93	$4,250.29	$2,442.36	135.1%
Fire Protection Service					
Public					
Hydrant charge		$52.53	$158.08	$105.55	200.9%
Inch-Foot Charge		$0.0325	$0.02775	($0.0048)	-14.6%
Private					
4 Inch Connection		$137.53	$128.10	($9.43)	-6.9%
6 Inch Connection		$300.89	$367.51	$66.62	22.1%
8 Inch Connection		$536.77	$780.46	$243.69	45.4%

PROOF OF REVENUES

Service Charges				
Meter Size	Number of Bills		Quarterly Charge	Total
5/8 Inch	2176		$23.47	$51,070.72
3/4 Inch	16		$33.34	$533.36
1 inch	64		$50.41	$3,225.92
1.5 inch	56		$91.09	$5,100.76
2 inch	48		$140.97	$6,766.32
3 inch	8		$261.79	$2,094.28
4 inch	0		$429.16	$0.00
6 inch	0		$855.91	$0.00
8 inch	0		$1,421.21	$0.00
				$68,791.36
	2,368			
	128		$23.47	$3,004.16
	2,496			
Consumption Charges				
	75,000		$2.6590	$199,425.00
Fire Protection Charges				
	Public			
		65	$632.33	$41,101.45
		484,868	$0.1110	$53,820.35
	4		$2.41	$9.64
	Private			
4 Inch	1		$512.40	$512.40
6 Inch	10		$1,470.04	$14,700.40
8 Inch	2		$3,121.84	$6,243.68
		Total Billed revenues		$387,608.44
		Revenue requirement		$387,509.00
			Difference	$99.44
			% Difference	0.0257%

EXHIBIT NO. DFR-4

NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION

PITTSFIELD AQUEDUCT COMPANY

DOCKET NO. DR 97 -

QUALIFICATIONS AND EXPERIENCE

OF

DAVID F. RUSSELL, P.E.

STATEMENT OF

QUALIFICATIONS AND EXPERIENCE

Russell Consulting is a management consulting business with an office located in historic Newburyport, Massachusetts, just off Interstate 95. Mr. David F. Russell, P.E., the company's founder and President has set high standards for providing the most effective and timely services required by our clients. Some of the services provided by the practice include; management and financial consulting, utility economics and rates, expert witness services, water conservation programs (including revenue mitigation measures), utility contracts and negotiations, energy conservation and utilization options, feasibility studies, system appraisals, and related regulatory/institutional studies. (See the attached list for more detail.) Through partnering arrangements with several highly skilled professionals we are prepared to address a wide range of topics (broad scope of services), levels of effort, and short term deadlines.

Our client focus includes publicly owned utilities (electric, gas, water, wastewater and solid waste), municipalities and related government agencies. We also frequently provide assistance to consumer advocacy groups in their efforts to protect consumer interests before state and federal regulatory authorities. A new office was recently opened at **15 Titcomb Street, Suite 100, Newburyport, Massachusetts**. The Internet address is **DRussCon@AOL.com.**

Representative examples of projects performed by Russell Consulting or by Mr. Russell while working for other firms are summarized below. Following this summary of projects is Mr. Russell's resume, a listing of Services provided by Russell Consulting, and both a listing of Testimony he has provided and a list of his Publications/Presentations.

o For the **Illinois Association of Wastewater Agencies (IAWA)** Mr. Russell was the Project Manager for a study to prepare an Energy Conservation and Utilization Handbook and associated software. This publication provides a blueprint for member agencies, identifying and evaluating all cost effective measures to minimize total energy costs. The software package was marketed to member Agencies with the proceeds used to pay for preparation of the handbook.

o For the **Hartford Metropolitan District Commission** Mr. Russell was part of a team that studied the potential "supply' that could be obtained from an aggressive conservation program by evaluating residential, industrial and commercial initiatives. As part of the study a residential retrofit program was developed, which included the following elements: Evaluating the experience of retrofit programs performed by other communities; Determining the preferred method of marketing and distributing devices; Identifying and selecting a qualified contractor; Ensuring customer satisfaction; assisting the District develop appropriate public education

materials; and evaluating the cost effectiveness (benefit-cost analysis) of the retrofit programs in relation to other sources of supply available to the District.

o For the **Citizens Utility Board (CUB) of Chicago, Illinois** Russell Consulting successfully completed a project assisting in their intervention in an rate case for the Illinois - American Water Company before the Illinois Commerce Commission. Areas investigated included; Capital improvement planning process, Needs assessment, Least Cost Integrated Resource Planning, Current and alternative conservation Programs and related system impacts Excess capacity and renewal and replacement/depreciation expenses.

o For **Concord Electric Company** Mr. Russell was responsible for the Company's Demand-Side Management (DSM) program preparation, filing and approval before the New Hampshire Public Utilities Commission and both its implementation and follow-up reporting. This Included a complete evaluation of several expanded and new residential load management programs. The analysis included program design, expectations of customer participation, estimated savings energy (kwh) and demand (kw), effects an revenue recovery, design of associated rates, evaluation of customer impacts for both participants and non-participants, and detailed implementation plans and ongoing program review.

o Russell Consulting recently assisted the **New Hampshire Office of the Consumer Advocate** in their intervention in a rate case for the Consumers of New Hampshire Water Company (CNHWC), as their expert witness for the issues of used and useful plant investments and depreciation. Part of this project involves a comprehensive evaluation of the Company's planning process, its capital improvement programs, conservation and demand management programs, and associated rate impacts.

o For **Unitil Service Corp.** Mr. Russell was responsible for preparing long and short range forecasts of energy (kwh) and demand (kw) requirements for each retail affiliate company. This also included design and evaluation of requisite load research studies and customer surveys Both econometric and time series models were used for forecasting in combination with end use engineering analysis where appropriate. These forecasts were used to drive corporate financial models, in the development of capital expansion programs and to satisfy various regulatory reporting requirements.

o Russell Consulting provided expert witness services to **A Group of Intervenors (3 Towns in Eastern Massachusetts)** in their efforts to ensure fair and equitable rates for their citizens before the Massachusetts Public Utilities Commission in a rate case involving the Massachusetts American Water Company. Mr. Russell's testimony included issues of least cost integrated resource planning, evaluation of specific capital improvement projects, excess capacity, prudence of major plant investments, the used and useful criteria applied to specific facilities, evaluation of conservation programs and system impacts, price elasticity of demand for water, revenue requirements, cost of service analysis and rate design.

o For **General Public Utilities** Mr. Russell played a key role in designing component programs and preparation of the Corporation's Conservation and Load Management Plan, which

was one of the first comprehensive DSM programs for a major private utility. He also prepared a report for senior management summarizing the benefits and disadvantages of a public power takeover by the New York Power Authority (NYPA) of certain nuclear facilities owned by the Corporation.

o For **Fitchburg Gas and Electric Company** Mr. Russell was responsible for the Company's first (Least Cost) Integrated Gas Resource Plan preparation, filing and approval before the Massachusetts Department of Public Utilities, and both its implementation and follow-up reporting. This Plan incorporated and responded to the significant changes which had taken place in the gas industry in recent years, and demonstrated the Company's capability and commitment to planning, analyzing and operating a reliable, least-cost gas resource portfolio in the new competitive business environment.

o For **Exeter and Hampton Electric Company** Mr. Russell was responsible for the Company's (Least Cost) Integrated Resource Plan preparation, filing and approval before the New Hampshire Public Utilities Commission, and both its implementation and follow-up reporting. This planning document was prepared on the basis of up-to-date information and analysis reflecting rapidly changing market conditions, and demonstrated the Company's strategic approach to the management of change and uncertainty.

o For the **New York State Energy Research and Development Authority (NYSERDA)** Mr. Russell evaluated the institutional and financial issues related to an innovative technology designed to improve the economics of resource recovery (waste-to-energy) plants. Key issues included rules and regulations of the New York Public Service Commission and related PURPA requirements.

o Russell Consulting as part of a team of consultants is providing economic and financial consulting services to the **City of Albuquerque, New Mexico**. Services include a comprehensive financial evaluation of the City's Water and Wastewater Enterprise Fund. The purpose of this study is to assess current financial management strategies and to identify opportunities for improvement relative to the administration of the capital improvement program and both rate changes and fiscal planning objectives. Particular emphasis is placed on the City's recently enacted aggressive water conservation program and related impacts. This work also included the development of a generalized benefit-cost spreadsheet model that can be used to evaluate alternative capital improvement projects as well as conservation and other demand management programs.

o Mr. Russell provided economic and financial assistance to the **Bahamas Water and Sewerage Corporation (BWSC)** in their efforts to secure a technical assistance loan from the World Bank. This loan was needed for a $40 million capital improvement program, which was eligible for 25% funding through the World Bank. These services included preparation of technical documents for review by the World Bank and assistance throughout the negotiation process. Almost all of the capital improvement program and funding analysis was adopted by the BWSC and later approved by the World Bank, including their $10 million loan share. The remaining funds were provided by a group of cofinancing agencies (32%) including the European

Investment Bank, the Caribbean Development Bank, and the InterAmerican Development Bank; a 28% capital contribution from the Government of the Bahamas; and the remainder from internally generated funds and a small private bank loan. Mr. Russell's responsibilities centered on determining the financial feasibility, required rate increases to users, customer impacts and willingness to pay evaluations.

o For the **Institute for Public-Private Partnerships** Russell Consulting prepared a one day international seminar held in Washington, D. C. (November, 1995) for utility managers on Project Appraisals, Economic Analysis and Financing Techniques. Specific topics included the following; Economic Analysis of Large Scale Projects, Comparing Project Analysis Objectives and Methodologies, Valuation Techniques for Measuring Economic Opportunity Costs, Applying Economic Analysis Investment Criteria and Decision Making Techniques, and Techniques for Measuring Capital Budgeting Investment Criteria. Additionally, Customer Impacts and both Willingness and Ability to Pay issues were covered.

o For the **Sewerage and Water Board of New Orleans** Mr. Russell was the project manager for a comprehensive management audit of the Board's entire system and operations. Functional areas covered by the audit included; management, engineering, operations and maintenance, facilities planning, finance, and personnel. Special emphasis was placed on commercial systems - customer relations, billing and collections, meter reading and repair and management information systems (MIS); and a complete office space study for these groups including a review of the current office environment, industry standards for office space and recommended improvements. This project lasted several months and resulted in many improvements in all functional areas reviewed. Mr. Russell was responsible for managing and coordinating the efforts of a diverse and highly skilled team of professionals. He was also responsible for the field audit, preparation of reports, internal review and all presentations to the client.

o Mr. Russell was part of a consulting team that was contracted by the **Government of Mexico** to develop a training program for water and wastewater utilities. The purpose of this program was to train the managers of water and wastewater utilities on alternative methods of recovering revenues through user charges. This work included a summary of ratemaking principles that would apply to small and medium size utilities operating in Mexico. Specific topics included were cost-of-service studies, rate design, types of charges, customer classes, and customer impacts. These standard guidelines were specifically developed for training mid and upper level managers who would be responsible for those functions. His role was focused on developing detailed outlines of training manuals to be used by professional trainers, as part of regional conferences. While in Mexico he worked closely with personnel from the national college (IMTA) in the City of Cuernavaca, Morales, Mexico.

o Mr. Russell provided technical assistance to the **Government of Egypt** as part of a wastewater service charge study for the Greater Cairo wastewater Project. As part of his work on this project he developed a comprehensive cost of service and tariff design model which was used to estimate component and total costs of providing wastewater services, and resulting tariff levels needed to satisfy social and economic goals. Customer impacts, willingness to pay

evaluations, and related institutional factors were also a critical part of the analysis. The final report presented estimates of required service charge levels (as a percentage of the water supply tariff) necessary to recover 100% (and several partial recovery levels) of the O&M costs for the Greater Cairo Wastewater System covering the five year period ending in 1997.

o For the **City of San Antonio, Texas** Mr. Russell was part of a team of consultants that evaluated a rate increase proposed by the City Water Board. This analysis focused on the issues of capital improvements program, financial planning, determination of revenue requirements, cost of service allocations, rate design, and extension policies. The City Water Board is an operating entity of the City, responsible for providing retail and wholesale water service to the City and surrounding communities. A series of interim reports addressing each of these issues in an objective manner were prepared and presented to the City. After review and input from City officials, a final report was presented containing a summary of key findings and conclusions along with several recommendations for adjustments and preferred alternatives.

o While working for a **National Environmental Engineering Company** Mr. Russell played a key role in performing numerous feasibility studies on solid waste projects including; development and expansion of sanitary landfills, waste-to-energy facilities (or resource recovery plants), and landfill gas recovery systems. Additionally, for many of these projects he negotiated the sale of electric energy and capacity to electric utilities located near the facility. For example, he was the project engineer for feasibility studies prepared for resource recovery facilities located in Bristol, Connecticut; Lancaster, Pennsylvania; Fall River, Massachusetts; and five separate County facilities in Florida (Hillsboro, Jacksonville, Lee, Manatee and Pasco). He also completed economic and financial evaluations for waste-to-energy plants in Kent County, Michigan; Lake County, Illinois; and Oakland County, Michigan. In total these projects comprise more than $3 billion in bond issues.

o For the **City of Warwick, Rhode Island** Mr. Russell was the Project Manager for an Inventory and Appraisal study used to establish an enterprise fund for the City's water utility. This study involved the cataloguing of all depreciable assets, the determination of the original cost value of each asset, the determination of depreciation rates for each type of asset, and determination of the accumulated depreciation reserve.

o For the **Town of Wallingford, Connecticut** Mr. Russell was the Project Manager for a comprehensive evaluation of the Town's municipal electric utility, focusing on the financial and institutional benefits associated with public ownership. This study focused on three key areas of concern to the Town and its relationship with the Electric Division. These included: payments to the Town for services it provided to the Division, and compensation for the risks it incurs as owner of the system; reserve requirements of the Division; and an assessment of the Division's total costs and a forecast of rates over the next five years.

o For the **Jamaica Water Supply Company (JWSC)** Mr. Russell was instrumental in completing four innovative financial/rate studies for this large water utility. These included; an Inventory and Appraisal of all assets on both an original cost and replacement cost basis (including depreciation rates, annual expenses and accumulated reserves); A cost separation study

which allocated all costs-of-service between that portion of the system in Queens County and the remainder in Nassau county; A cost of Service/ Rate Design filing and testimony before the New York Public Service Commission; and a severance Study in anticipation of a public takeover of the Queens portion of the system.

o Mr. Russell assisted the **Boston Water and Sewer Commission** evaluate the advantages and disadvantages of alternative water and wastewater rate structures, including; conservation rates, Low income and life-line rates, Service charges, Seasonal rates, Impact fees, Stormwater charges and Industrial wastewater rates. The objectives of each alternative were described along with the form of the rate structures and variations that were available. The impact on the Commission in terms of revenue enhancement, revenue stability, and both short term and long term implementation costs were presented, along with associated customer impacts. As a result of this analysis the Commission adopted several recommendations, including new conservation rates that have five increasing blocks with several interim ratchet steps within each block.

o For the **Logansport Municipal Utility (LMU)** Mr. Russell negotiated an Interconnection Agreement with a large private utility (Public Service of Indiana - PSI). Negotiated services included supplemental capacity and energy, limited term capacity and energy, emergency service, short term capacity and energy, economy energy, non-displacement energy, and utilization of surplus transmission line capacity. He also performed a focused management audit for LMU, targeted at four critical areas - organizational structure, staff requirements, operational goals and performance measures, and management information systems.

o For a **Town in Southern New Hampshire** Mr. Russell was part of a project team that evaluated the feasibility of purchasing and operating the private water company currently providing service within its town limits. The purpose of the study was to determine the financial , legal, operational and regulatory effects of public acquisition. A key focus was on assessing the net fiscal effects on the town of such an acquisition. The team estimated the likely range of acquisition prices for the private company's assets; assessed the present condition of the system and determined what capital improvements were necessary; projected future operating costs and assessed alternative sources of supply; evaluated the legal and regulatory process for acquiring the private system; and forecast the likely costs and benefits to the town and its residents.

o For the Towns of **Barrington, Bristol and Warren, Rhode Island** Mr. Russell assisted in evaluating the advantages and disadvantages of public ownership/operation of the privately owned water utility. A system asset evaluation was performed, which was used in determining the purchase price of the utility's assets. The team also assessed the operation and maintenance of the system by the private utility, including all sources of supply, treatment and distribution facilities, in order to prepare a plan of operations under public ownership. Additionally, a 10 year capital improvement program was prepared along with a budgeting process for public ownership. Subsequently, these towns purchased the privately owned water utility and formed the Bristol County Water Authority.

o For the **Town of South Kingstown, Rhode Island** Mr. Russell was the Project Manager for a study that evaluated a range of privatization alternatives for the municipal water. utility. Several options were considered ranging from a direct sale with full private ownership and operation to continued municipal ownership with operation services contracted to a private company. The analysis included an assessment of current municipal operations in terms of its organization, management, staffing and facilities. A comparable evaluation of a nearby private company was also performed to assess its capability to manage and operate the town's water system. Total system costs under each type of option were estimated along with the customer impacts associated with each option. Lastly, the role of the State Public Utilities Commission was factored in to provide a range of the likely acquisition price, and the affects on rate base and level of rates under private ownership.

o For **Eastern Utilities Associates** Mr. Russell managed a group of rate engineers/analysts with responsibility for rate design and cost of service studies for three affiliated retail utilities, including fuel, purchased power, and oil conservation charges. Also, as part of a systemwide Corporate team, he assisted in the preparation of a major (nine volumes) rate filing with the FERC covering all wholesale power sales and transmission services.

o For several **Small Power Producers (SPP)** Mr. Russell negotiated power contracts for their total output (30 to 60 MW range). This included SPPs and utilities in the Northeast, the Midwest and Florida. In most of these cases, as the lead technical negotiator for the SPP, he was able to secure long term annual payments (rates) above market levels from the purchasing electric utility. He also assisted a **SPP in New Hampshire** with its rate filing before the New Hampshire Public Utilities Commission. This also included estimating the costs of wheeling electricity over the T&D facilities owned by Public Service of New Hampshire (PSNH).

o For the **Reading Municipal Light Department** Russell Consulting provided advice and assistance to their senior management in preparing a comprehensive proposal to the Massachusetts Department of Public Utilities to be the Department's power broker for managing, administrating and allocating all of the low cost hydro power the Commonwealth receives from the New York Power Authority.

o For **Unitil Service Corp.** Mr. Russell was responsible for a transmission system cost-of-service-study for wholesale power wheeling charges to five Independent Power Producers, the associated transmission tariffs and FERC Filings, and negotiations with each customer. He also drafted a retail wheeling contract for transmission service over transmission/distribution facilities owned by affiliated retail companies. Additionally, he was responsible for developing Economic Incentive Rates (including transmission services) for companies expanding their businesses within the Company's service territory. This also involved contract negotiations with each company before the terms and conditions could be finalized.

o For the **City of Springfield, Massachusetts** Mr. Russell determined the water utility's net asset value and accumulated depreciation (rate base) plus annual depreciation expenses in order to update their wholesale water rates. The city did not maintain complete asset records, so

it was necessary to determine original cost values, depreciation rates, and accumulated depreciation reserves from partial historic records and newer construction projects.

As a natural extension of all of his work, Mr. Russell has been associated with and/or worked with many law firms specializing in public utility law and regulations. He has provided expert witness testimony before several state Public Utility Commissions and Legislative Committees. This broad experience, coupled with extensive training in economics, engineering and management science, has provided him with the tools needed to provide effective consulting services to both U.S. and international clients. (Russell Consulting through association with other international firms has agreed to provide rate and financial consulting services to the countries of Indonesia, China and Egypt.)

For a more comprehensive summary of Mr. Russell's qualifications and experience see the attached documents - Resume, Expert Testimony Provided, Services Provided, and a List of Publications/Presentations.

RESUME - DAVID F. RUSSELL, P.E.

PROFESSIONAL EXPERIENCE

CURRENT POSITION: Owner and founder of a private consulting practice - **Russell Consulting.** Business Objective - provide timely and highly effective management and financial consulting services to public and private utilities, municipalities, and related government agencies and private companies. Through a network of associated professionals Russell Consulting provides a wide range of management and financial services, including; management consulting, utility economics, conservation and demand management programs, rate design and cost of service studies, and utility/business appraisals. Mr. Russell is an economist and engineer with broad experience in both operational and strategic planning; cost/benefit studies; economic/financial analysis of capital improvement programs; and rate design/cost of service studies. He has 25 years of experience within the utility industry and environmental sector as a Professional Engineer, Economist and Manager.

As the Director of the Regulatory Services for **Unitil Service Corp**., a regional utility holding company, Mr. Russell managed the staff and resources of the Regulatory Services Department. The Company's retail affiliates (electric and gas utilities) are regulated by two state Public Utility Commissions and the FERC. Areas of functional responsibility included; sales and load forecasting, customer and load research, rate research and analysis, rate design, rate and tariff administration, revenue requirements and cost of service studies, economic analysis, demand side management (DSM) planning, program design and evaluation, and related analytical services.

In this position, Mr. Russell was responsible for insuring that rates and cost recovery for the retail Co's. contributed positively to the continued financial strength of the Corp., and that positive regulatory relations were maintained. He successfully developed and implemented expanded DSM programs in both Ma. and N.H. He was also responsible for preparing and filing each retail Co's. Least Cost Integrated Resource Plans covering the next ten years, including the first Integrated Gas Resource Plan. He successfully managed and coordinated an external (PUC) audit of the accounting and control of all DSM expenditures by the affiliated retail Companies in N. H.

As Chief Engineer with the **Massachusetts DPU**, Mr. Russell reviewed, conducted public hearings, and reported on the need for and the costs and benefits of major construction projects proposed by electric, gas and water utilities; including powerplants, substations, transmission lines, gas storage facilities (LNG, SNG and Propane), gas pipelines, and water tanks and mains. He was instrumental in developing the States' gas pipeline safety code and was responsible for the gas pipeline safety program funded by the U.S. Dept. of Transportation. He also helped to design and implement the Cost of Gas Adjustment (CGA) clause for all retail gas utilities. He managed the environmental review process which included writing internal procedures, the "Scope of Work" for major facilities, and statewide rules and regulations. While in this position, he was appointed by the Governor to two special Commissions, The Cogeneration Comm., and the Public Power Comm.

As a Principal Management Consultant with **Camp Dresser and McKee, Inc.** (CDM), Mr. Russell took a lead role in many projects including management audits, financial feasibility reports, privatization studies and rate/cost of service studies for a wide range of municipal and private utilities. In that

position he gained international experience as a financial advisor to the Water and Sewerage Corp. of the Bahamas and the World Bank, and the Governments of Egypt and Mexico. He served as project manager for a management audit of the Sewerage and Water Board of New Orleans, looking at all phases of their organization, operations and capital assets programs. As part of a major study for the N. J. Dept. of Environmental Protection, Mr. Russell was responsible for evaluating the costs and benefits of various ownership options, including a Regional Authority and both public and private water utilities, and financing alternatives for supplying the long term requirements of the metro Camden area.

For the Town of Wallingford, Conn., he was project manager of a study that evaluated the town's municipal electric utility focusing on the financial and institutional benefits associated with public ownership. Mr. Russell assisted the City of Logansport, Ind. in evaluating the management, organization and control of the City-owned and operated electric utility (Logansport Municipal Utility - LMU). Key areas of this work consisted of a focused management audit and preparation of a management action plan. This evaluation was targeted at four critical areas - organizational structure, staff requirements, operational goals and performance measures, and management information systems. He also assisted the City, as its chief technical negotiator, in negotiations with Public Service of Indiana for a long term wholesale power contract.

Mr. Russell has completed many rate studies for communities or authorities throughout New England and the northeast. Some of these involved the adoption of innovative rate structures designed to encourage conservation, and in two cases the differentiation of cost factors and rates based on geographic location. For the Cities of Warwick and E. Providence and the Blackstone Valley District Comm., he established sewer user fees based on water consumption for all users, replacing existing flat fees or ad-valorem taxes. He also provided rate consulting services to the Boston Water and Sewer Comm.; the City of Providence, R. I.; The Jamaica Water Supply Co.; the Wastewater Div. of the City of Orrville, Ohio; the Artesian Water Co. (DE); the Kent County Water Auth. and the Town of Webster, Ma., Wastewater Division.

He was the lead consultant for several projects involving the evaluation and appraisal of utility facilities and property. For the City of Warwick, R. I., he was responsible for a complete inventory and appraisal of all assets owned and operated by the municipal water utility. For the Jamaica Water Supply Co. he played a lead role in evaluating that utility's assets based on the replacement cost new less depreciation (RCLD) method and in allocaating the revenue requirements between the two service area separated by the county line. For the Town of South Kingstown, he prepared a comprehensive evaluation of alternative privatization options (ownership and operations) for the public water supply system. He also served as CDM's manager of all appraisal/ acquisition studies for the multibillion dollar Central Artery/Harbor Tunnel project in Boston, Ma.

Another area of specialization, which he took a lead role in, was feasibility studies for waste to energy facilities and contract negotiations for the sale of electric energy and capacity to power companies. He completed assignments as project engineer for feasibility studies for several resource recovery facilities located in the Northeast, the Midwest and Fla. He negotiated power contracts for many of these resource recovery plants. For the Ill. Association of Wastewater Agencies he wrote an Energy Handbook that provided a blueprint for member utilities, identifying and evaluating all cost effective measures to reduce, manage or switch energy resources in order to minimize total system energy costs.

For **Eastern Utilities Associates,** a regional electric utility, Mr. Russell was a Section Manager within the Rate Dept. where he was responsible for the development and implementation of several pass-through rate clauses designed to recover specific capital and operating costs based on customer demands and/or total use. These cost recovery mechanisms included fuel, purchased power, and oil conservation adjustment clauses. He also played a key role in preparing rate filings before the Federal Energy Regulatory Comm. for the Co.'s wholesale affiliate, and was responsible for all PURPA related programs for the Co.'s retail affiliates in Ma. and R. I.

As a Senior Engineer for **General Public Utilities**, Mr. Russell provided in-house consulting services to the Corporate Planning Div. where he was instrumental in implementing the systemwide strategic planning process. He also assisted the Forecasting, Load Research and Supply Planning groups in determining the need for new power plants and the least cost alternatives. This work included the development of the firm's conservation and load management program.

As a Consultant to the **New Jersey Board of Public Utilities,** Mr. Russell participated in the development of standard purchase and sale rates for cogeneration facilities and small powerplants, as required by PURPA. Additionally, he presented staff's case on rate of return issues involving proposed rate increases by major electric utilities.

PERSONAL: U.S. Citizen Married, three children.
SSN: 032-34-5417 1st Lt., U.S Army NG (Inactive Res.)

EDUCATION: 1984, **Rutgers University**, New Brunswick, NJ M.A., Economics (Resource and Regulatory Economics) 1977, **Northeastern University**, Boston, MA M.S., Engineering Management (Operations Research and Finance) 1971, **Rutgers College,** New Brunswick, NJ B.S., Electrical Engineering (Full scholarship).

PROFESSIONAL REGISTRATION: Registered Prof. Engineer in MA (28342) & NJ (26512)

PROFESSIONAL MEMBERSHIPS: I.E.E.E. (Power Engr. & Engr. Management Sections); National Society of Prof. Engrs.; American Public Power Assoc.; American Water Works Assoc. and the N. E. Chapter (Member of the Rates and Conservation Committees); Rutgers Engineering Society.

PUBLICATIONS\PRESENTATIONS: Author of several papers published in professional journals and presentations given at regional and national conventions.

EXPERT WITNESS SERVICES: Provided expert testimony in numerous quasi-judicial proceedings before several state Public Utility Commissions and Legislative Committees. Areas of expertise include many of the issues and topics outlined above.

COMMUNITY SERVICE: Chairman of the Planning Board, City of Newburyport, Ma.; Chairman of the Mayor's Special Task Force on Police Facilities; Member of the Merrimack Valley Planning Commission; I.C. Parish Council; Treasurer for the region's State Representative.

ADJUNCT PROFESSOR: Part-time instructor at Boston University teaching Undergraduate and Graduate courses in Economics, Management Science and Finance.

LIST OF EXPERT WITNESS TESTIMONY - DAVID F. RUSSELL, P.E.

- Revenue Requirements (by geographic service areas), Cost-of-Service, Marginal Cost analysis, Rate Design, Customer Impacts, Utility System Appraisal, and Severance Costs for the Jamaica Water Supply Company, before the **NEW YORK PUBLIC SERVICE COMMISSION**

- Capital Improvement Planning Process, Needs Assessment, Evaluation of Specific Capital Improvement Projects, Excess Capacity, Prudency Evaluation, Application of Used and Useful Criteria, Least Cost Integrated Resource Planning, Conservation and Demand Management, Depreciation Studies and Rates, Average Service Lives and Remaining Useful Lives, for the Office of the Consumer Advocate (Concord, New Hampshire) before the **NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION**

- DSM Program Design and Implementation, Least Cost Integrated Planning, Demand Forecasting/Needs Assessment, Customer Impacts, and Rate Design for the Fitchburg Gas and Electric Company before the **MASSACHUSETTS PUBLIC UTILITIES COMMISSION**

- Needs Assessment, Capital Improvement Planning Process, Evaluation of Specific Capital Improvement Projects, Excess Capacity, Prudency Evaluation, Application of Used and Useful Criteria, Least Cost Integrated Resource Planning, Evaluation of Conservation Programs and System Impacts, Price Elasticity of Demand for Water, Revenue Requirements, Rate Design, and Cost of Service Study for a Group of Intervenors (Hull, Hingham and Cohasset, Ma.) in a rate case involving the Massachusetts American Water Company before the **MA. PUBLIC UTILITIES COMMISSION**

- Public Power Vs: Private Ownership/Operation, Cogeneration and Small Power Producers, and Fuel and Purchase Power Adjustment Clauses for the Massachusetts Department of Public Utilities before the **SENATE COMMITTEE ON GOVERNMENT REGULATIONS (MA)**

- Least Cost Integrated Resource Planning, Capital Improvement Planning Process, Needs Assessment, Evaluation of Specific Capital Improvement Projects, Excess Capacity, Conservation and Demand Management, Renewals and Replacements and Depreciation Rates for the Citizens Utility Board (Chicago, Illinois) before the **ILLINOIS COMMERCE COMMISSION**

- Revenue Requirements, Cost-of-Service, Fuel/Purchased Power/Conservation Charges, Customer Impacts, and Rate Design for the Blackstone Valley Electric Company before the **RHODE ISLAND PUBLIC UTILITIES COMMISSION**

- DSM Program Design and Implementation, Project Management and Cost Control, Least Cost Integrated Planning, Demand Forecasting/Needs Assessment, Economic Conditions and Growth Potential, Customer Impacts, and Rate Design for the Concord Electric Company and the Exeter and Hampton Electric Company before the **NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION**

- o Return on Equity, Cost of Debt, Total Cost of Capital, Cogeneration and Small Power Producer Rates for the New Jersey Board of Public Utilities before the **THE NEW JERSEY BOARD OF PUBLIC UTILITIES**

- o Revenue Requirements, Cost-of-Service Study, Evaluation of Alternative Costing Methodologies, Marginal Cost analysis, Rate Design, and Customer Impacts, for the Artesian Water Co. before the **DELAWARE PUBLIC SERVICE COMMISSION**

- o Revenue Requirements, Cost-of-Service, Fuel/Purchased Power/Conservation Charges, Customer Impacts, and Rate Design for the Eastern Edison Company before the **MA. PUBLIC UTILITIES COMMISSION**

- o Negotiated Purchased Power Contract, Rates, and Terms and Conditions for the County of Hillsborough, Florida before the **FLORIDA PUBLIC SERVICE COMMISSION**

- o Revenue Requirements, Cost-of-Service, Rate Differentials by Service Area, Customer Impacts, Return on Equity/Risk Premium, and Rate Design for the Providence Water Supply Board, before the **RHODE ISLAND PUBLIC UTILITIES COMMISSION**

SERVICES PROVIDED

RUSSELL CONSULTING provides a broad spectrum of services to public and private utilities (electric, gas, water, wastewater and solid waste), municipalities, regional and state agencies, and private industrial/commercial businesses. Primary services provided are outlined below:

- ***Management and Financial Consulting***
  - Program/Project Management
  - Feasibility Studies
  - Project Financing
  - Strategic Planning
  - Management Audits
  - Accounting and MIS
  - Litigation Support

- ***System Planning and Needs Assessment***
  - Capital Improvement Programs
  - Demand Forecasting
  - Least Cost Integrated Resource Planning
  - DSM Program Design and Implementation
  - Prudence Reviews
  - Expert witness Services

- ***Evaluation of Utility Systems/Asset Appraisals***
  - Utility Appraisals
  - Inventory of Utility Assets
  - Acquisition Studies
  - Evaluation of Assets for Sale
  - Negotiation Services
  - Property Tax Evaluations
  - Establishment of Depreciation Charges and Reserves
  - Expert Witness Testimony

- ***Design and Engineering Studies***
  - Generation Facilities
  - Transmission Systems
  - Distribution Systems
  - Feasibility Studies
  - Expert Witness Services

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- ***Rate Case Preparation and Presentation***
  - Cost-of-Service Studies
  - Rate Design
  - Cost of Capital
  - Revenue Requirements
  - Depreciation Studies
  - Fuel and Purchased Power Adjustment Clauses
  - Expert Witness Services

- ***Regulatory/Institutional Studies***
  - Cost/Benefit Studies
  - Privatization studies
  - Energy Management and Conservation
  - Municipal Acquisitions
  - Environmental Assessments and Impact Reports
  - Air Quality Control and Monitoring
  - Evaluation of Public Vs: Private Ownership/Operation
  - Assessment of Impacts Related to new Laws and Regulations

- ***Special Services/Studies***
  - Energy Management/Audits
  - Utility Rate Options and Special Contracts
  - Contract Negotiation Services
  - Land Use Planning/Development/Permitting
  - Renewable Resources and Hydro Licensing
  - Small Power Producer/Cogeneration Studies
  - Evaluation and Development of Waste-to-Energy Plants

LIST OF PUBLICATIONS & PRESENTATIONS - DAVID F. RUSSELL, P.E.

David F. Russell and Christopher P. N. Woodcock, "What Will Water Rates be Like in the 1990s?" American Water Works Association Journal, Vol. 84, September 1992, pp. 68-72.

David F. Russell and Daniel D. Lanning, "The 'Value' of Appraising Municipal Water Systems: A Case Study." Journal of the New England Water Works Association, Vol. 107, No. 3 Sept. 1993, p.176-186.

David F. Russell, P.E., "Energy Savings at Wastewater Treatment Plants." Proceedings of the Water Environment Federation, 65th Annual Conference and Exposition, New Orleans, LA, 1992.

David F. Russell, "Focused Management Audit - Logansport Municipal Utilities, Electric Generating Plant." Draft Report prepared for Executive Management of the Town's Municipal Electric Utility while employed by Camp Dresser & McKee Inc. (CDM), August 1993.

David F. Russell, "Revenue Impacts Resulting from Conservation and Mitigation Strategies." A Presentation given at a Water Conservation Seminar and Workshop sponsored by the New England Water Works Association through the Conservation Committee (Mr. Russell is a member) held in Boxborough, Ma., October, 1996.

Theodore C. Schlette and David F. Russell, P.E., "Issues in Peak Load Pricing: Can Water Be Priced Like Electricity." Paper presented at the Joint Management Conference of the American Water Works Association and the Water Environment Association, March 1993.

David F. Russell and Daniel D. Lanning, "Evaluation of the Town's Electric Division, Town of Wallingford, Connecticut." A Report prepared for the Finance Committee of Wallingford's Town Council while employed by CDM, July 1991.

David F. Russell, P.E., "Evaluation of Privatization Alternatives for Municipal Water Services." Paper presented at a Joint Meeting of the Massachusetts Water Works Association and the New England Water Works Association, Hyannis, MA, April, 1991.

David F. Russell, "Cost of Service Studies" A Presentation given at a Water Utility Ratemaking Seminar and Workshop sponsored by the New England Water Works Association through the Water Rates Committee (Mr. Russell is a member) held in Boxborough, Ma., December, 1996.

David F. Russell, P.E., "Energy Conservation and Utilization - A Handbook For Wastewater Treatment Plants in Illinois." Report prepared for the Illinois Association of Wastewater Agencies, September 1991. Seven Chapters and Five Appendices.

David F. Russell, "The Fuel Adjustment Clause in Rate Schedules of Electric Utilities. A Cost Benefit Analysis." Masters Thesis, Masters of Arts Graduate Program in Economics, Rutgers University, New Brunswick, NJ, October 1984.

David F. Russell, "Commercial Systems Study." A Management Audit Report Prepared for Executive Management of the Sewerage and Water Board of New Orleans while employed by CDM, Feb., 1986.

David F. Russell, P.E. and Mary Ellen Hardy, "Appraisal/Acquisition Report, East Boston - Properties Bordering the Logan Airport Egress Road" A land and buildings hazardous waste appraisal report (one of many) prepared for the Ma. Highway Dept. and the Central Artery Project while employed by CDM, August 1993.

David F. Russell, "An Econometric Model and forecast of Jersey Central rower and Light Company's Residential Kwh Sales, 1980 - 2000." Graduate Research paper, Fairleigh Dickinson University, Madison, NJ, Spring Semester 1981.

David F. Russell, P.E., "Fire Protection Charges." Paper presented at a New England Water Works Association Seminar - Alternative Revenue Source Development for Water Utilities, December 1989.

David F. Russell, "Natural Gas-Fired Superheating of Steam From MSW Energy Recovery Facilities (Section 8 - Financial and Institutional Considerations)." A Report prepared for Executive Management of the New York State Energy Research and Development Authority while employed by CDM, Jl.1989.

David F. Russell, "Management Audit Phase-One Report." A Management Audit Report Prepared for Executive Management of the Kent County (Rl) Water Authority while employed by CDM, Feb., 1986.

David F. Russell, "PASNY and Indian Point No. 3, A Descriptive Summary and Implications for GPU." Report prepared for Executive Management of General Public Utilities while employed as a Strategic Planner, January 1979.

David F. Russell, "A Retrospective Analysis of Total Costs Associated with Oyster Creek, Three Mile Island 1 and Alternatives." Report prepared for Executive Management of General Public Utilities while employed as a Strategic Planner, March, 1980.

David F. Russell, "Inventory and Appraisal Report" A systemwide inventory and asset evaluation report prepared for Executive Management of the Warwick (Rhode Island) Water Department while employed by CDM, October 1991.

David F. Russell, "Deregulation In the Electric Utility Industry." Graduate Research Paper, Master of Arts In Economics Program, Rutgers University, New Brunswick NJ, Spring Semester 1983.

David F. Russell, "An Empirical Examination of Economies of Scale of the Electric Utility Industry in New England." Graduate Research Paper, Master of Arts in Economics Program, Rutgers University, New Brunswick NJ, fall semester 1983.